

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 23 AUG 2005

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Applicant's or agent's file reference 032778woHigo	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2004/003666	International filing date (day/month/year) 06.04.2004	Priority date (day/month/year) 07.04.2003	
International Patent Classification (IPC) or national classification and IPC G08B13/19, H03M3/00			
Applicant MICROSYSTEMS ON SILICON (PTY) LTD. et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input checked="" type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  17.02.2005		Date of completion of this report  22.08.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Coffa, A  Telephone No. +49 89 2399-7107	



# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/EP2004/003666

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

### Description, Pages

1-8 as originally filed

### Claims, Numbers

1-7 filed with telefax on 17.02.2005

### Drawings, Sheets

1/4-4/4 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. II Priority**

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1. ☒ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:  
☒ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).  
☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

1. Claim 1

D1 discloses " a sensing device " which in essence corresponds to device of claim 1. However D1 does not disclose the following technical features (a) and (b):

Sensing device for sensing a physical parameter such as radiation, temperature or the like, comprising:

- an analogue sensor element sensitive for the physical parameter to be sensed and outputting an analogue signal (figure 2, reference sign (56)) and
- an analogue-to-digital converter (ADC) having an MOS input stage (figure 2 reference signs (42,51)) for receiving the analogue output signal of the sensor element so as to convert the analogue output signal to a digital output signal (column 1, line 65-68, column 2, line 1-3),

(a) wherein the analogue sensor element is a passive infra-red sensor element and

(b) wherein the ADC has a differential MOS input stage to which the output terminals of the passive infra-red sensor element are directly connected.

The subject-matter of claim 1 is therefore **novel (Article 33(2) PCT)**.

The problem to be solved may therefore be regarded as :

" to avoid or reduce the generation of noise and offset voltages depending on the temperature introduced by a traditional JFET input stage by directly connecting the infra-red sensor to differential MOS input stage. Furthermore this differential MOS input stage eliminates influences of the supply voltage on the output of the sensor element "

The solution to this problem proposed in claim 1 of the present application is considered as involving **an inventive step (Article 33(3) PCT)** for the following reasons :

Although the use of passive infrared sensors as described by D4 (figure 1a, column 3, lines 7-9) and the use of differential CMOS ADCs by D1 ( figure 2) within a sensing device is well known. A combination of both documents would not lead to the device as defined by claim 1 of the application.

Furthermore the prior art did not disclose nor suggest the direct connection of the passive infrared sensor to the differential MOS input stage of an ADC within a sensing device as defined by above mentioned technical feature (b).

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(SEPARATE SHEET)**

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2. Claims 2-7

Claims 2-7 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT).

**CLAIMS**

1. Sensing device for sensing a physical parameter such as radiation, temperature or the like, comprising:
  - an analogue sensor element sensitive for the physical parameter to be sensed and outputting an analogue signal and
  - an analogue-to-digital converter (ADC) having an MOS input stage for receiving the analogue output signal of the sensor element so as to convert the analogue output signal to a digital output signal,
  - wherein the analogue sensor element is a passive infra-red sensor element and
  - wherein the ADC has a differential MOS input stage to which the output terminals of the passive infra-red sensor element are directly connected.
2. Sensing device according to claim 1, wherein the output of the ADC is connected to a digital feedback logic in turn connected to a digital-to-analogue converter (DAC) the output signal of which is added to the output signal of the analogue sensor element.
3. Sensing device according to claim 1 or 2, wherein the ADC is a sigma-delta-converter comprising an integrator and a comparator connected in series to each other.
4. Sensing device according to any one of claims 1 to 3, further comprising a decimation filter receiving the output signal of the ADC.
5. Sensing device according to any one of claims 1 to 4, further comprising a compensation temperature sensor for sensing the ambient temperature.

6. Sensing device according to any one of claims 1 to 5, further comprising a lens for selecting the direction from which radiation can be received by the analogue sensor element so as to be sensed.
7. Sensor device according to any one of claims 1 to 6, further comprising a single line output providing the digital output signal for transmitting to a signal processing unit like e.g. a microcontroller or the like.